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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/664,157	09/17/2003	Yong-Tac Kim	61610070AA	4172
58027	7590	11/28/2006	EXAMINER	
H.C. PARK & ASSOCIATES, PLC 8500 LEESBURG PIKE SUITE 7500 VIENNA, VA 22182			CHU, HELEN OK	
			ART UNIT	PAPER NUMBER
			1745	

DATE MAILED: 11/28/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/664,157	<b>Applicant(s)</b> KIM ET AL.	
	<b>Examiner</b> Helen O. Chu	<b>Art Unit</b> 1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on 25 September 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-38 is/are pending in the application.
- 4a) Of the above claim(s) 26-38 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-25 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>7/6/2006</u> . | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Election/Restrictions*

1. Applicant's election with traverse of claims Group 1, claims 1-25 in the reply filed on September 25, 2006 is acknowledged. The traversal is on the ground(s) that Applicant does not believe by law that the term "distinct" and "independent" is correct and each term contradicts one another, therefore, the Election/Restriction held is improper by the Examiner. This is not found persuasive because the Examiner must follow the guideline below when the Restriction is proper.

#### **803 [R-3] Restriction — When Proper**

Under the statute, the claims of an application may properly be required to be restricted to one of two or more claimed inventions only if they are able to support separate patents and they are either independent (MPEP § 802.01, § 806.06, and § 808.01) or distinct (MPEP § 806.05 - § 806.05(j)).

If the search and examination of all the claims in an application can be made without serious burden, the examiner must examine them on the merits, even though they include claims to independent or distinct inventions.

The Examiner believes the Applicant has improperly read the MPEP. The guidelines that an Examiner must follow are to prove if the different groups are distinct or (emphasis added) independent from each other and to see if there are burdensome searches involved. The burdensome search was proven by the Examiner indicating that a different search would have to be made in different subclasses. Next, the Examiner proved that the groups are distinct and reasons why they are distinct. The restrictions are repeated below for convenience:

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2. Restriction to one of the following inventions is required under 35 U.S.C. 121:
  - I. Claims 1-25, drawn to a method of fabricating negative electrode, classified in class 429, subclass 215 .
  - II. Claims 26-34, drawn to method of fabricating a negative electrode, classified in class 429, subclass 209.
  - III. Claims 35-38, drawn to a lithium battery, classified in class 429, various classes.

The inventions are distinct, each from the other because of the following reasons:

Inventions II and I are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make another and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the product as claimed can be made by another and materially different process. Specifically, the electrode does not require a slurry mixture as a process step. The electrode can be made by dipping the lithium metal filled with organosulfur into the solvent.

\ Inventions III and I are related as combination and subcombination. Inventions in this relationship are distinct if it can be shown that (1) the combination as claimed does not require the particulars of the subcombination as claimed for patentability, and (2) that the subcombination has utility by itself or in other combinations (MPEP § 806.05(c)). In the instant case, the combination as claimed does not require the particulars of the subcombination as claimed because the combination as claimed can

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have a negative electrode without an organosulfur protective layer. The subcombination has separate utility such as the subcombination can be used in a fuel cell..

Inventions III and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make another and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case, the product as claimed can be made by another and materially different process. Specifically, the product does not require a slurry mixture as a process step. The electrode can be made by dipping the lithium metal filled with organosulfur into the solvent.

Because these inventions are independent or distinct for the reasons given above and have acquired a separate status in the art in view of their different classification, restriction for examination purposes as indicated is proper.

The requirement is still deemed proper and is therefore made FINAL.

### ***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 19 and 23 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The recitation "less than or equal to about" is unclear

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to the Examiner. The term "less than or equal" is either less than or equivalent to that value but the term "about" can slightly less than or slightly greater than the value. The two terms contradict one another. Revision is appropriate

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1-7, 9-17, 19-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Skotheim et al. (US Patent 5,961,672) in view of Sotomura (US Patent 6,245,458 B1).

7. In regard to claims 1-4, 6, 7, 9, 20, 21, 24, the Skotheim et al. discloses a secondary battery with a composite lithium anode that stabilizes against dendrite formation with a thin film of lithium ion-conductive polymer interposed between the lithium metal and the electrolyte (Column 2, Lines 41-45). The Skotheim et al. reference further discloses that the electroconductive polymer film may be any conjugated structure, which is capable of being doped electrically conductive by lithium ions (Column 6, Lines 55-58), but does not disclose an organosulfur protective layer. However, the Sotomura reference discloses an electrode composite that can be used in a metallic lithium anode (Column 2, Lines 1-4), which exhibits high energy density and gives a high charging and discharging efficiency and good charging and discharging

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cycle life property used in a secondary battery (Column 2, Lines 39-44). The lithium electrolyte as part of the electrode gelled with a polyethylene oxide polymer (Column 5, Lines 43-58) onto the electrode composite of 2,5, dimercapto-1,3,4-thiadiazole (Column 4, Line 15) with an electrically conductive support such as doped polyaniline (Column 4, lines 56-60). Therefore, it would have been obvious to one of ordinary skill at the time the invention was made to incorporate the organosulfur protective layer as disclosed by Sotomura reference to the lithium anode as disclosed by the Skotheim et al. reference in order to provide a secondary battery with high energy density and current output.

In regard to claims 5, 19, 23, it would have been obvious to one of ordinary skill to only put an organosulfur (100wt %) on the electrode and no polyaniline (0 wt%) compound or polyethylene oxide (0 wt %) as a reference electrode for testing purposes and comparative examples.

In regards to claim 22, the Sotomura reference discloses the average molecular of the ionic conductive material to have an average molecular weight to be 20,000 (Column 6, Lines 17-23)

It is noted that claims 10-17 are product-by-process claims. "Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F. 2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). Since, the doped electron conductive

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polymer as disclosed by Sotomura is similar to that of the Applicant's, Applicant's process is not given patentable weight in this claim.

8. Claims 8 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Skotheim et al. (US Patent 5,961,672) in view of Sotomura (US Patent 6,245,458 B1) as applied to claim 6, in further view of Zuiho et al. (JP Publication 10-101793).

In regard to claims 8 and 18, the Sotomura reference discloses the use of polyaniline polymer obtained by means of an electrolytic polymerization from aniline or derivatives with an electric conductivity of  $10^{-5}$  S/cm (Column 4, Lines 30-47). However, it does not disclose the use of emerald base polymer made of polyaniline or a doping ratio of about 30%. The Zuiho et al. discloses polyaniline emerald base polymer with the electric conductivity in the range of  $10^{-10}$ -101 S/cm (Abstract). It would have been obvious to one of ordinary skill at the time the invention was made to replace polyaniline as disclosed by Sotomura with other polyaniline derivatives such as the polyaniline emerald base compound with the same physical properties as disclosed by Zuiho et al., since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416. Furthermore, the electron conductive polymer polyaniline is the same as the Applicants' claimed invention, therefore, the physical property is the same such as the doping ratio of at least 30%.

9. Claim 24 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Skotheim et al. (US Patent 5,961,672) in view of Sotomura (US Patent 6,245,458) in



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further view of Chu (US Patent 5,523,179) as evidence by Fauteux et al. (US Patent 6,030,719).

The Skotheim et al. discloses a secondary battery with a composite lithium anode that stabilizes against dendrite formation with a thin film of lithium ion-conductive polymer interposed between the lithium metal and the electrolyte (Column 2, Lines 41-45) and the Sotomura reference discloses an organosulfur protective layer on composite electrodes, but does not disclose weight percentage of the compounds. However, the Chu reference discloses lithium/organosulfur batteries are known to be low cost and low equivalent weight (Column 2, Lines 1-3). The Chu reference further discloses an active-sulfur material in a weight percent of 20 to 80%, an ionically conductive material of 15%, and 40% electronically conductive material (Claim 42(b)). It would have been obvious to one of ordinary skill to combine the active material with the weight percentage as disclosed by Chu to the electrodes as disclosed by Skotheim et al. in order to produce an efficient battery of low cost and weight. Furthermore, the Fauteux et al. presents evidence in a secondary battery cell configuration, that an anode and cathode will become interchangeable with each other depending on whether the cell is charging or discharging (Column 3, Lines 41-44).

### ***Conclusion***


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Helen O. Chu whose telephone number is (571) 272-5162. The examiner can normally be reached on Monday-Friday 8am-4:30pm.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

HOC

  
**TRACY DOVE**  
**PRIMARY EXAMINER**  
*11/00*